U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-253 143

GRENADA LAKE, CALHOUN, GRENADA, AND YALOBUSHA COUNTIES, MISSISSIPPI

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

PREPARED FOR
NATIONAL ENVIRONMENTAL RESEARCH CENTER

JUNE 1975

TECHNICAL REPORT DATA *(Please read Instructions on the reverse before completing)*		
1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB-253 143
4. TITLE AND SUBTITLE Report on Grenada Lake, Calhoun, Grenada, and Yalobusha Counties, Mississippi		5. REPORT DATE Prepared June 1975 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 361
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460		13. TYPE OF REPORT AND PERIOD COVERED Final - 1973 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release unlimited		44
	20. SECURITY CLASS *(This page)*	22. PRICE 4.00

EPA Form 2220-1 (9-73)

153109

PB 253 143

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT
ON
GRENADA LAKE
CALHOUN, GRENADA, AND YALOBUSHA COUNTIES
MISSISSIPPI
EPA REGION IV
WORKING PAPER No. 361

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON

and

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

☆GPO—697-032

REPORT

ON

GRENADA LAKE

CALHOUN, GRENADA, AND YALOBUSHA COUNTIES

MISSISSIPPI

EPA REGION IV

WORKING PAPER No. 361

WITH THE COOPERATION OF THE

MISSISSIPPI AIR AND WATER POLLUTION

CONTROL COMMISSION

AND THE

MISSISSIPPI NATIONAL GUARD

JUNE, 1975

CONTENTS

	Page
Foreword	ii
List of Mississippi Study Lakes	iv
Lake and Drainage Area Map	v
Sections	
I. Conclusions	1
II. Lake and Drainage Basin Characteristics	3
III. Lake Water Quality Summary	4
IV. Nutrient Loadings	8
V. Literature Reviewed	13
VI. Appendices	14

F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Mississippi Air and Water Pollution Control Commission for professional involvement and to the Mississippi National Guard for conducting the tributary sampling phase of the Survey.

Glen Wood, Jr., Director, and John Smith, Deputy Director of the Air and Water Pollution Control Commission; and John Harper, Don Scott, John Sigman, and Dwight Wylie of the Water Division provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

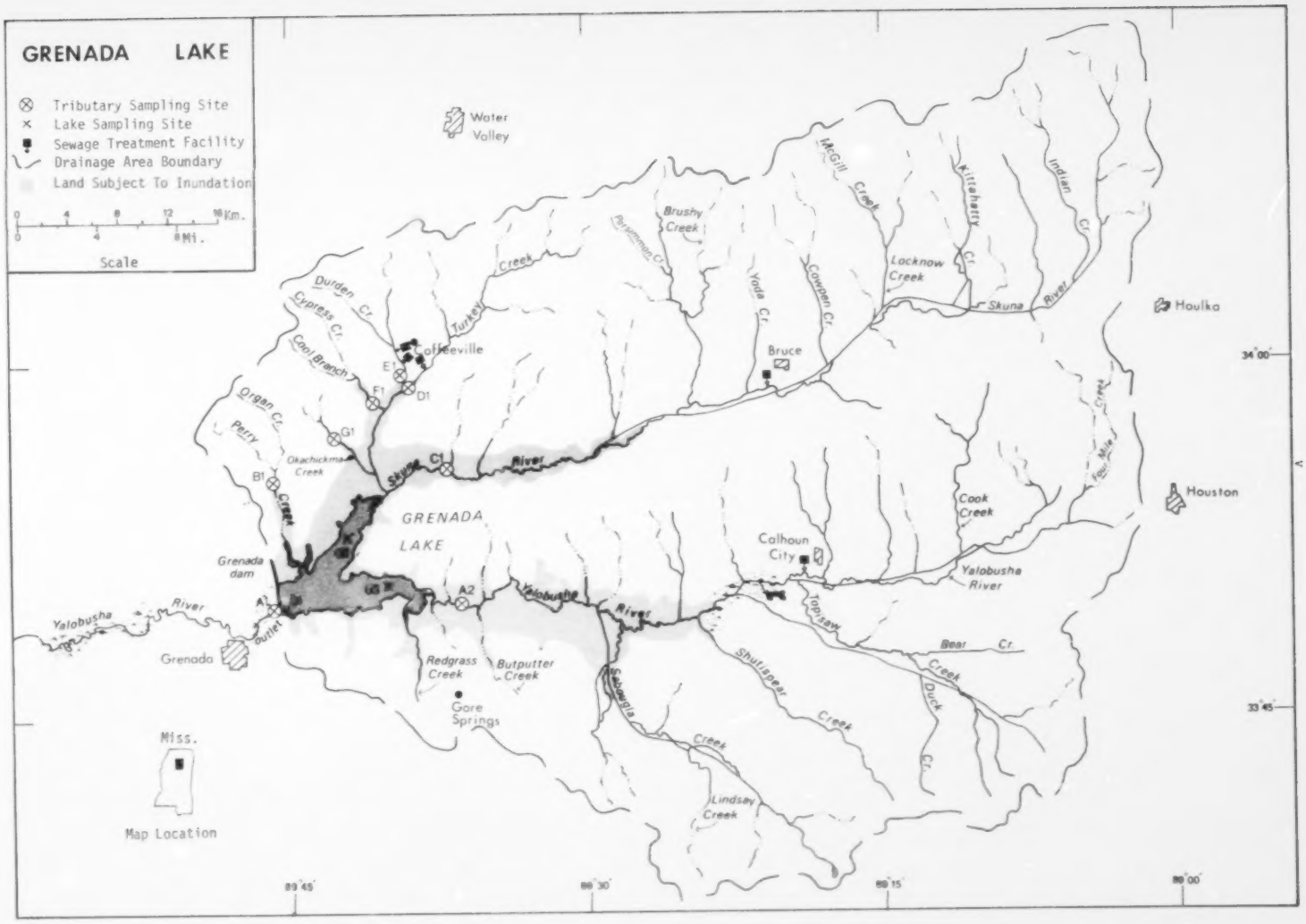
Major General E. A. Beby Turnage, the Adjutant General of Mississippi, and Project Officer Major Thomas D. Nichols, who directed the volunteer efforts of the Mississippi National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF MISSISSIPPI

LAKE NAME	COUNTY
Arkabutla	DeSoto, Tate
Enid	Yalobusha
Grenada	Calhoun, Grenada, Yalobusha
Pickwick	Tishominga
Ross Barnett	Jackson, Madison, Rankin
Sardis	Lafayette, Panola


GRENADA LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Land Subject To Inundation
0 4 8 12 16 Km.
0 4 8 Mi.
Scale
Water Valley
Durden Cr.
Cypress Cr.
Cool Branch
Turkey Creek
Coffeeville
Brushy Creek
Yocona Cr.
Coowen Cr.
McGill Creek
Kitchahezy Cr.
Indian Cr.
Locknow Creek
Skuna River
Houlka
Bruce
34°00'
Organ Cr.
Perry Creek
Okachickma Creek
Skuna River
GRENADA LAKE
Grenada dam
Yalobusha River
Grenada
Redgrass Creek
Butputter Creek
Gore Springs
Calhoun City
Cook Creek
Houston
Topisaw
Bear Cr.
Duck Creek
Shutlasear Creek
Lindsay Creek
Miss.
Map Location
89°45'
89°30'
89°15'
89°00'
33°45'

GRENADA LAKE

STORET NO. 2806

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Grenada Lake is eutrophic. It ranked third in overall trophic quality when the five Mississippi lakes sampled in 1973 were compared using a combination of six parameters*. Two of the lakes had less median total phosphorus, three had less median dissolved phosphorus, three had less median inorganic nitrogen, none had less mean chlorophyll a, and three had greater mean Secchi disc transparency. Depression or near-depletion of dissolved oxygen with depth occurred at all three sampling stations in June and August.

Survey limnologists noted a pea-soup green appearance in June, 1973.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Grenada Lake was phosphorus limited at the time the sample was collected (06/14/73). The lake data indicate phosphorus limitation at all sampling times.

C. Nutrient Controllability:

1. Point Sources--The phosphorus contributions of known point sources amounted to only about 3% of the total reaching Grenada Lake during the sampling year. The three Coffeeville

---

* See Appendix A.

sewage treatment facilities collectively contributed 1.0% of the total. Other contributors were the communities of Calhoun City (1.3%) and Bruce (0.9%).

The present phosphorus loading of 1.57 $g/m^2/yr$ is over twice that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 12). Because of this, and because Grenada Lake is phosphorus-limited, all phosphorus inputs should be minimized to the greatest practicable extent to slow the aging of this water body.

2. Non-point sources--Almost 97% of the total phosphorus input to Grenada Lake came from non-point sources during the sampling year. The Yalobusha River contributed 43.5% of the total load; the Skuna River, 35.5%; Turkey Creek, 10.7%; and four smaller tributaries collectively contributed 4.4% of the load. The ungaged tributaries were estimated to have contributed 1.6% of the total phosphorus load.

The mean of the phosphorus export rates of the Grenada Lake tributaries was a relatively low 38 $kg/km^2/year$ (see page 12). The somewhat higher rates of the Skuna River (49 $kg/km^2/year$) and Turkey Creek (50 $kg/km^2/year$) may have resulted from under-estimation of point-source phosphorus contributions to those streams.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 98.38 kilometers^2.
2. Mean depth: 16.5 meters.
3. Maximum depth: 21.6 meters.
4. Volume: 1,623.270 x 10^6 m^3.
5. Mean hydraulic retention time: 1.1 years (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Yalobusha River	1,572.1	23.0
Perry Creek	73.8	0.9
Skuna River	1,126.6	17.5
Turkey Creek	334.1	5.2
Durden Creek	57.0	0.8
Cypress Creek	56.7	0.9
Okachickma Creek	22.0	0.3
Minor tributaries & immediate drainage -	78.1	3.4
Totals	3,320.4	52.0

2. Outlet -

Yalobusha River	3,418.8**	47.3

C. Precipitation***:

1. Year of sampling: 193.0 centimeters.
2. Mean annual: 134.6 centimeters.

---

† Table of metric conversions--Appendix B.
†† Smith, 1973.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Grenada Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 15.2 meters at station 1, 10.1 meters at station 2, and 16.2 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR GRENADA LAKE
STORET CODE 2806

PARAMETER	1ST SAMPLING (6/14/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/28/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 2/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	18.2 - 28.9	23.2	23.5	19.9 - 29.0	26.2	27.3	17.1 - 18.6	17.9	17.5
DISS OXY (MG/L)	1.4 - 7.2	4.6	4.8	0.1 - 7.2	3.3	4.6	8.0 - 8.6	8.3	8.2
CNDCTVY (MCROMO)	45. - 61.	50.	49.	59. - 78.	65.	61.	55. - 63.	58.	56.
PH (STAND UNITS)	6.1 - 7.6	6.8	6.9	6.3 - 6.9	6.6	6.5	7.1 - 7.5	7.3	7.2
TOT ALK (MG/L)	9. - 14.	11.	10.	18. - 29.	23.	22.	14. - 19.	17.	17.
TOT P (MG/L)	0.080 - 0.112	0.093	0.094	0.029 - 0.115	0.047	0.035	0.039 - 0.053	0.046	0.046
ORTHO P (MG/L)	0.008 - 0.024	0.012	0.011	0.004 - 0.020	0.008	0.007	0.007 - 0.019	0.011	0.011
NO2+NO3 (MG/L)	0.200 - 0.400	0.297	0.295	0.060 - 0.140	0.097	0.095	0.070 - 0.120	0.093	0.090
AMMONIA (MG/L)	0.200 - 0.320	0.239	0.220	0.060 - 0.450	0.161	0.090	0.040 - 0.120	0.059	0.050
KJEL N (MG/L)	0.400 - 1.500	0.537	0.450	0.400 - 1.500	0.757	0.700	0.300 - 0.600	0.410	0.400
INORG N (MG/L)	0.440 - 0.620	0.536	0.540	0.120 - 0.570	0.259	0.180	0.120 - 0.240	0.152	0.140
TOTAL N (MG/L)	0.630 - 1.700	0.834	0.795	0.520 - 1.580	0.854	0.805	0.370 - 0.710	0.503	0.485
CHLRPYL A (UG/L)	4.7 - 9.3	6.9	6.6	3.3 - 4.0	3.6	3.6	7.2 - 7.9	7.6	7.6
SECCHI (METERS)	0.3 - 0.3	0.3	0.3	0.9 - 1.0	0.9	0.9	0.5 - 0.7	0.5	0.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
06/14/73	1. *Melosira sp.*	3,060
	2. Flagellates	205
	3. *Stephanodiscus sp.*	43
	4. *Cryptomonas sp.*	29
	5. *Synedra sp.*	15
	Other genera	15
	Total	3,367
08/28/73	1. *Lyngbya sp.*	1,289
	2. *Cryptomonas sp.*	182
	3. *Melosira sp.*	161
	4. *Synedra sp.*	40
	5. *Mallomonas sp.*	40
	Total	1,712
11/02/73	1. Flagellates	1,699
	2. *Melosira sp.*	292
	3. *Cyclotella sp.*	154
	4. *Cryptomonas sp.*	120
	5. *Synedra sp.*	86
	Other genera	103
	Total	2,454

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
06/13-14/73	01	4.7
	02	6.6
	03	9.3
08/28/73	01	3.6
	02	4.0
	03	3.3
11/01-02/73	01	7.6
	02	7.9
	03	7.2

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.012	0.198	0.1
0.050 P	0.062	0.198	5.0
0.050 P + 1.0 N	0.062	1.198	20.0
1.0 N	0.012	1.198	0.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Grenada Lake was low at the time the sample was collected. Also, the addition of phosphorus alone produced a significant increase in yield, but the addition of nitrogen alone did not. These results indicate phosphorus limitation.

The lake data also indicate phosphorus limitation; i.e., at all sampling times, the mean inorganic nitrogen/orthophosphorus ratios were 14/1 or greater, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Mississippi National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v). Sampling was begun in August, 1973, and was completed in July, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Mississippi District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations B-1, F-1, and G-1 and multiplying the means by the ZZ area in km^2.

The operator of the Coffeeville #1 wastewater treatment plant provided monthly effluent samples but no flow data, and the communities of Bruce and Calhoun City did not participate in the Survey. Nutrient loads for Coffeeville #1, Bruce, and Calhoun City were estimated at 1.134 kg P and 3.401 kg N/capita/year. The untreated wastes of Coffeeville #2 and #3 were estimated at 1.587 kg P and 4.263 kg N/capita/year.

* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Coffeeville #1	100	stab. pond	37.8	Durden Creek
#2	300	none	113.6	Turkey Creek
#3	600	none	227.1	Durden Creek
Calhoun City	1,700*	stab. pond	643.4**	Yalobusha River
Bruce	1,200*	Imhoff tank	454.2**	Skuna River

2. Known industrial - None

† Murphy, 1973.
* Anonymous, 1971.
** Estimated at 0.3875 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Yalobusha River	67,010	43.5
Perry Creek	2,430	1.6
Skuna River	54,745	35.5
Turkey Creek	16,565	10.7
Durden Creek	1,470	1.0
Cypress Creek	2,395	1.6
Okachickma Creek	490	0.3
b. Minor tributaries & immediate drainage (non-point load) -	2,525	1.6
c. Known municipal STP's -		
Coffeeville #1	115	<0.1
#2	475	0.3
#3	950	0.6
Calhoun City	1,930	1.3
Bruce	1,360	0.9
d. Septic tanks* -	10	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	1,720	1.1
Total	154,190	100.0

2. Outputs -

Lake outlet - Yalobusha River 139,520

3. Net annual P accumulation - 14,670 kg.

* Estimate based on ten lakeshore dwellings and five parks; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Yalobusha River	804,220	50.3
Perry Creek	27,250	1.7
Skuna River	443,905	27.7
Turkey Creek	133,140	8.3
Durden Creek	16,610	1.0
Cypress Creek	22,385	1.4
Okachickma Creek	4,485	0.3
b. Minor tributaries & immediate drainage (non-point load) -	25,200	1.6
c. Known municipal STP's -		
Coffeeville #1	340	<0.1
#2	1,280	<0.1
#3	2,560	0.2
Calhoun City	5,780	0.4
Bruce	4,080	0.3
d. Septic tanks* -	285	<0 1
e. Known industrial - None	-	-
f. Direct precipitation** -	106,210	6.6
Total	1,597,730	100.0

2. Outputs -

Lake outlet - Yalobusha River 1,319,175

3. Net annual N accumulation - 278,555 kg.

* Estimate based on ten lakeshore dwellings and five parks; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Yalobusha River	43	512
Perry Creek	33	369
Skuna River	49	394
Turkey Creek	50	399
Durden Creek	26	291
Cypress Creek	42	395
Okachickma Creek	22	204

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	1.57	0.15	16.2	2.8

Vollenweider phosphorus loadings (g/m^2/yr) based on mean depth and mean hydraulic retention time of Grenada Lake:

"Dangerous" (eutrophic loading)	0.76
"Permissible" (oligotrophic loading)	0.38

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. EPA Publ. OWP-1, vol. 4, Wash., DC.

Murphy, W. Carroll, 1973. Treatment plant questionnaire (Coffeeville STP's). MS Air & Water Poll. Contr. Comm., Jackson.

Smith, John, 1973. Personal communication (lake morphometry). MS Air & Water Poll. Contr. Comm., Jackson.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
2801	ARKABUTLA LAKE	0.198	0.440	485.111	6.500	15.000	0.025
2802	ENID LAKE	0.062	0.240	465.000	6.578	14.900	0.009
2804	ROSS BARNETT RESERVOIR	0.045	0.140	462.917	9.992	14.600	0.008
2805	SARDIS LAKE	0.041	0.190	447.750	6.425	14.800	0.009
2806	GRENADA LAKE	0.051	0.305	476.778	6.022	14.900	0.010

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
2801	AHKABUTLA LAKE	0 (0)	0 (0)	0 (0)	50 (2)	0 (0)	0 (0)	50
2802	ENID LAKE	25 (1)	50 (2)	50 (2)	25 (1)	38 (1)	63 (2)	251
2804	ROSS BARNETT RESERVOIR	75 (3)	100 (4)	75 (3)	0 (0)	100 (4)	100 (4)	450
2805	SARDIS LAKE	100 (4)	75 (3)	100 (4)	75 (3)	75 (3)	63 (2)	488
2806	GRENADA LAKE	50 (2)	25 (1)	25 (1)	100 (4)	38 (1)	25 (1)	263

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	2805	SARDIS LAKE	488
2	2804	ROSS BARNETT RESERVOIR	450
3	2806	GRENADA LAKE	263
4	2802	ENID LAKE	251
5	2801	ARKABUTLA LAKE	50

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR MISSISSIPPI 02/18/76

LAKE CODE 2806 GRENADA LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 3418.8

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
2806A1	3418.8	46.52	53.77	59.64	43.98	48.17	63.29	57.26	55.08	50.26	42.82	24.86	22.17	47.28
2806A2	1572.1	53.15	54.37	67.88	35.14	12.06	4.02	11.50	3.51	0.91	0.79	16.42	18.60	23.04
2806B1	73.8	1.81	2.35	2.44	2.07	0.74	0.20	0.11	0.03	0.14	0.02	0.51	0.96	0.94
2806C1	1126.6	35.85	42.48	52.13	27.64	9.57	4.50	6.31	2.44	1.10	0.85	14.95	14.05	17.51
2806D1	334.1	8.41	10.96	11.07	9.68	4.70	2.55	1.87	1.10	2.10	0.93	3.77	5.64	5.19
2806E1	57.0	1.39	1.81	1.87	1.61	0.76	0.40	0.28	0.14	0.31	0.14	0.62	0.93	0.85
2806F1	56.7	1.39	1.84	1.90	1.64	0.76	0.40	0.28	0.17	0.34	0.14	0.62	0.93	0.86
2806G1	22.0	0.34	0.51	0.48	0.51	0.34	0.14	0.17	0.03	0.08	0.0	0.20	0.31	0.26
2806ZZ	271.9	8.69	0.96	11.69	6.51	2.38	0.99	1.73	0.62	0.37	0.23	3.11	3.43	3.42

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 3418.8
SUM OF SUB-DRAINAGE AREAS = 3514.4
TOTAL FLOW IN = 628.90
TOTAL FLOW OUT = 567.81

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2806A1	8	73	89.65	21	82.12				
	9	73	93.79	19	96.28				
	10	73	108.74	24	113.27				
	11	73	91.80	19	114.68				
	12	73	80.56	18	120.35				
	1	74	63.06	19	107.60				
	2	74	150.65	19	161.41				
	3	74	154.16	18	152.91				
	4	74	58.13	21	18.41				
	5	74	15.12	18	8.50				
	6	74	49.75	20	58.05				
	7	74	128.02	22	130.26				
2806A2	8	73	1.22	21	0.51				
	9	73	0.37	19	0.25				
	10	73	3.45	24	0.40				
	11	73	84.95	19	0.68				
	12	73	75.04	18	2.83				
	1	74	175.56	19	37.10				
	2	74	64.56	19	104.77				
	3	74	33.13	18	7.50				
	4	74	28.60	21	9.06				
	5	74	82.12	18	47.57				
	6	74	99.11	20	32.28				
	7	74	25.49	22	4.11				

TRIBUTARY FLOW INFORMATION FOR MISSISSIPPI 02/18/76

LAKE CODE 2806 GRENADA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
280681	8	73	0.05	21	0.01				
	9	73	0.01	19	0.01				
	10	73	0.03	24	0.01				
	11	73	2.55	19	0.05				
	12	73	2.38	18	0.09				
	1	74	6.31	19	2.27				
	2	74	2.18	19	3.54				
	3	74	1.05	18	0.12				
	4	74	1.47	21	0.31				
	5	74	3.45	18	4.22				
	6	74	2.86	20	2.46				
	7	74	0.65	22	0.05				
2806C1	8	73	1.19	21	0.71				
	9	73	0.62	19	0.51				
	10	73	2.27	24	0.62				
	11	73	66.54	19	0.82				
	12	73	59.47	18	1.98				
	1	74	152.91	19	27.47				
	2	74	49.55	19	84.95				
	3	74	24.07	18	4.25				
	4	74	20.67	21	4.98				
	5	74	64.56	18	36.81				
	6	74	79.29	20	23.50				
	7	74	17.84	22	2.49				
2806D1	8	73	1.33	21	0.76				
	9	73	0.82	19	0.59				
	10	73	1.16	24	0.76				
	11	73	12.18	19	1.33				
	12	73	10.28	18	1.81				
	1	74	28.60	19	10.51				
	2	74	9.97	19	16.03				
	3	74	5.64	18	2.04				
	4	74	6.97	21	3.09				
	5	74	15.69	18	19.37				
	6	74	12.94	20	11.21				
	7	74	4.47	22	1.39				
2806E1	8	73	0.20	21	0.11				
	9	73	0.11	19	0.08				
	10	73	0.17	24	0.11				
	11	73	2.04	19	0.17				
	12	73	1.76	18	0.28				
	1	74	4.84	19	1.76				
	2	74	1.70	19	2.75				
	3	74	0.96	18	0.31				
	4	74	1.19	21	0.48				
	5	74	2.69	18	3.28				
	6	74	2.21	20	1.90				
	7	74	0.74	22	0.20				

TRIBUTARY FLOW INFORMATION FOR MISSISSIPPI 02/18/76

LAKE CODE 2806 GRENADA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2806F1	8	73	0.20	21	0.11				
	9	73	0.14	19	0.11				
	10	73	0.17	24	0.11				
	11	73	1.98	19	0.20				
	12	73	1.76	18	0.28				
	1	74	4.84	19	1.76				
	2	74	1.70	19	2.72				
	3	74	0.96	18	0.31				
	4	74	1.19	21	0.48				
	5	74	2.69	18	3.28				
	6	74	2.18	20	1.90				
	7	74	0.74	22	0.23				
2806G1	8	73	0.20	21	0.03				
	9	73	0.06	19	0.06				
	10	73	0.11	24	0.08				
	11	73	1.10	19	0.14				
	12	73	0.34	18	0.11				
	1	74	1.56	19	0.17				
	2	74	0.65	19	3.09				
	3	74	0.25	18	0.23				
	4	74	0.45	21	0.17				
	5	74	1.44	18	0.68				
	6	74	1.08	20	0.48				
	7	74	0.34	22	0.08				
2806ZZ	8	73	0.34	21	0.17				
	9	73	0.17	19	0.11				
	10	73	0.59	24	0.14				
	11	73	14.50	19	0.25				
	12	73	12.86	18	0.59				
	1	74	31.71	19	6.77				
	2	74	11.04	19	18.32				
	3	74	5.58	18	1.22				
	4	74	5.04	21	1.53				
	5	74	14.50	18	9.46				
	6	74	16.99	20	6.09				
	7	74	4.25	22	0.71				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/18

280601
33 48 35.0 089 45 06.0 3
GRENADA LAKE
28043 MISSISSIPPI

11EPALES 2111202
0054 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/14	11 30	0000	26.7		12	47	7.20J	10K	0.270	0.600	0.210	0.011
	11 30	0006	26.7	6.4		47	6.90J	10K	0.200	0.400	0.240	0.008
	11 30	0015	23.9	5.8		50	6.50J	10K	0.250	0.400	0.330	0.016
	11 30	0030	19.7	4.4		50	6.20J	10K	0.220	0.400	0.390	0.012
	11 30	0050	18.2	3.0		52	6.10J	11	0.220	0.400	0.400	0.018
73/08/28	10 00	0000	27.7		37	61	6.70	22	0.090	1.500	0.080	0.011
	10 00	0005	27.5	6.4		61	6.70	21	0.080	1.000	0.100	0.007
	10 00	0015	27.1	4.6		60	6.50	19	0.100	0.400	0.120	0.008
	10 00	0025	24.5	0.2		73	6.30	24	0.250	0.700	0.120	0.007
	10 00	0035	20.4	0.1		78	6.30	25	0.440	0.900	0.120	0.020
	10 00	0043	19.9	0.1		78	6.40	29	0.450	1.000	0.120	0.020
73/11/02	07 33	0000	18.5		27	56	7.50	14	0.070	0.600	0.110	0.013
	07 33	0005	18.5	8.2		56	7.30	18	0.120	0.300	0.120	0.019
	07 33	0015	18.6	8.0		56	7.10	19	0.040	0.300	0.100	0.010
	07 33	0035	18.5	8.0		55	7.10	17	0.050	0.300	0.110	0.012

DATE FROM TO	TIME OF DAY	DEPTH FEET	09665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/14	11 30	0000	0.083	4.7
	11 30	0006	0.080	
	11 30	0015	0.088	
	11 30	0030	0.097	
	11 30	0050	0.110	
73/08/28	10 00	0000	0.043	3.6
	10 00	0005	0.033	
	10 00	0015	0.037	
	10 00	0025	0.051	
	10 00	0035	0.103	
	10 00	0043	0.115	
73/11/02	07 33	0000	0.039	7.6
	07 33	0005	0.044	
	07 33	0015	0.039	
	07 33	0035	0.046	

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 76/02/18

280602
33 51 25.0 089 42 40.0 3
GRENADA LAKE
28043 MISSISSIPPI

11EPALES 2111202
0037 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/13	12 20	0000	27.5		12	46	7.60J	10K	0.250	1.500	0.200	0.014
	12 20	0006	26.6	7.2		47	7.00J	10K	0.210	0.400	0.230	0.009
	12 20	0015	25.6	6.6		48	6.70J	10K	0.200	0.400	0.290	0.010
	12 20	0025	20.9	3.4		51	6.30J	10K	0.220	0.400	0.340	0.014
	12 20	0033	19.6	3.0		54	6.30J	10	0.250	0.500	0.370	0.013
73/08/28	10 45	0000	29.0		35	61	6.90	19	0.090	0.800	0.080	0.008
	10 45	0005	28.8	7.2		61	6.80	20	0.070	0.500	0.070	0.006
	10 45	0015	27.6	4.6		63	6.50	22	0.090	0.500	0.080	0.005
	10 45	0023	25.6	0.4		74	6.30	28	0.210	0.700	0.090	0.005
73/11/01	16 13	0000	17.5		18	62	7.50	17	0.050	0.500	0.070	0.009
	16 13	0005	17.5	8.6		62	7.50	18	0.050	0.300	0.070	0.012
	16 13	0011	17.5	8.4		63	7.50	18	0.060	0.400	0.080	0.012

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/13	12 20	0000	0.100	6.6
	12 20	0006	0.081	
	12 20	0015	0.080	
	12 20	0025	0.095	
	12 20	0033	0.112	
73/08/28	10 45	0000	0.047	4.0
	10 45	0005	0.034	
	10 45	0015	0.031	
	10 45	0023	0.041	
73/11/01	16 13	0000	0.051	7.9
	16 13	0005	0.050	
	16 13	0011	0.053	

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 76/02/18

280603
33 49 45.0 089 40 35.0 3
GRENADA LAKE
28043 MISSISSIPPI

11EPALES 2111202
0057 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/14	13 00	0000	28.9		12	45	7.30J	11	0.220	0.700	0.240	0.008
	13 00	0006	25.9	6.6		48	7.00J	10	0.220	0.500	0.260	0.008
	13 00	0015	23.1	5.4		49	7.00J	10	0.270	0.500	0.340	0.014
	13 00	0028	20.7	4.8		49	7.00J	9	0.220	0.400	0.370	0.024
	13 00	0040	19.1	1.6		61	7.00J	13	0.320	0.500	0.300	0.011
	13 00	0053	18.9	1.4		61	6.90J	14	0.280	0.600	0.240	0.009
73/08/28	11 45	0000	28.8		38	60	6.80	22	0.080	0.600	0.080	0.004
	11 45	0005	27.8	6.6		59	6.70	23	0.060	0.600	0.060	0.004
	11 45	0015	26.9	4.8		61	6.50	24	0.080	0.500	0.100	0.005
	11 45	0027	25.8	1.6		66	6.40	18	0.170	0.900	0.140	0.007
73/11/02	07 52	0000			18		7.20	17	0.050	0.500	0.090	0.007
	07 52	0005	17.1	8.2		56	7.20	15	0.050	0.500	0.090	0.010
	07 52	0010	17.1	8.6		57	7.10	15	0.050	0.400	0.090	0.008

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/14	13 00	0000	0.093	9.3
	13 00	0006	0.081	
	13 00	0015	0.088	
	13 00	0028	0.100	
	13 00	0040	0.103	
	13 00	0053	0.103	
73/08/28	11 45	0000	0.031	3.3
	11 45	0005	0.029	
	11 45	0015	0.032	
	11 45	0027	0.031	
73/11/02	07 52	0000	0.046	7.2
	07 52	0005	0.048	
	07 52	0010	0.047	

J VALUE KNOWN TO BE IN ERROR

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 76/02/23

2806A1
33 48 30.0 089 46 20.0 4
YALOBUSHA RIVER
28071 15 GRENADA
O/GRENADA LAKE
RD AT S END OF GRENADA DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	12 30		0.044	0.340	0.098	0.032	0.075
73/09/19	13 30		0.058	1.650	0.198	0.015	0.170
73/10/24	08 30		0.072	1.050	0.023	0.026	
73/11/19	13 30		0.052	1.450	0.064	0.016	0.040
73/12/18	13 00		0.140	0.800	0.085	0.035	0.250
74/01/19			0.216	0.800	0.100	0.020	0.075
74/02/19	12 30		0.176	0.800	0.140	0.040	0.115
74/03/18	13 55		0.160	0.400	0.055	0.025	0.105
74/04/21	07 30		0.144	0.900	0.070	0.025	0.035
74/05/18	08 00		0.116	0.400	0.065	0.019	0.065
74/06/20	08 00		0.176	0.500	0.035	0.015	0.060
74/07/22	14 00		0.136	0.500	0.025	0.020	0.063

STORET RETRIEVAL DATE 76/02/23

2806A2
33 49 00.0 089 36 55.0 4
YALOBUSHA RIVER
28 15 COFFEEVILLE
I/GRENADA LAKE
RD BRDG 4 MI N OF GORE SPRINGS
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	14 36		0.019	0.320	0.020	0.017	0.045
73/09/19	15 15		0.018	2.000	0.100	0.006	0.080
73/10/24	09 30		0.018	0.600		0.006	0.175
73/11/19	15 00		0.352	2.700	0.092	0.012	0.100
73/12/18	14 30		0.160	0.600	0.085	0.035	0.110
74/01/19	08 40		0.148	0.500	0.095	0.050	0.130
74/02/19	14 00		0.084	0.600	0.060	0.025	0.105
74/03/18	14 30		0.048	0.500	0.049	0.015	0.060
74/04/21	08 45		0.168	1.800	0.130	0.045	0.125
74/05/18	09 45		0.136	0.600	0.080	0.025	0.095
74/06/20	09 30		0.112	0.700	0.040	0.015	0.055
74/07/22	15 00		0.020	0.400	0.020	0.010	0.015

STORET RETRIEVAL DATE 76/02/23

280681
33 53 50.0 089 46 50.0 4
PERRY CREEK
28 15 GRENADA
T/GRENADA LAKE
HWY 7 BRDG 7 MI NNE OF GRENADA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	12 47		0.048	0.780	0.042	0.012	0.070
73/09/19	13 40		0.094	2.300	0.650	0.007	0.130
73/11/19	13 45		0.056	1.300	0.052	0.016	0.055
73/12/18	13 10		0.152	0.400	0.070	0.020	0.060
74/01/19	09 35		0.176	0.100K	0.050	0.020	0.055
74/02/19	13 15		0.088	0.500	0.035	0.020	0.105
74/03/18	14 05		0.092	0.400	0.030	0.010	0.055
74/04/21	07 45		0.076	0.600	0.025	0.010	0.010
74/05/18	09 00		0.056	0.700	0.040	0.022	0.190
74/06/20	08 15		0.156	0.800	0.045	0.015	0.095
74/07/22	14 25		0.016	0.600	0.015	0.010	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/23

2806C1
33 54 40.0 089 37 50.0 4
SKUNA RIVER
28 15 COFFEEVILLE
T/GRENADA LAKE
RD BRDG 1 MI S OF GUMS
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21			0.016	0.290	0.013	0.012	0.035
73/09/19	14 50		0.010K	0.550	0.018	0.006	0.108
73/10/24	09 20		0.058	0.750	0.074	0.006	0.080
73/11/19	14 40		0.168	1.450	0.128	0.020	0.170
73/12/18	13 45		0.104	1.200	0.097	0.020	0.060
74/01/19	08 50		0.136	0.400	0.130	0.035	0.135
74/02/19	13 45		0.088	0.600	0.055	0.035	0.130
74/03/18	15 10		0.020	0.500	0.030	0.010	0.055
74/04/21	08 30		0.116	0.800	0.040	0.035	0.125
74/05/18	09 30		0.136	0.700	0.070	0.025	0.185
74/06/20	09 15		0.048	0.600	0.045	0.015	0.075
74/07/22	14 45		0.012	0.500	0.015	0.010	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/23

280601
33 58 00.0 089 39 50.0 4
TURKEY CREEK
28 15 COFFEEVILLE
T/GRENADA LAKE
ST HWY 330 BRDG .5 MI SE OF COFFEEVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	14 00		0.096	0.260	0.040	0.020	0.090
73/09/19	14 40		0.096	0.400	0.031	0.020	0.140
73/10/24	09 15		0.056	0.400	0.074	0.011	0.200
73/11/19	14 30		0.020	0.650	0.028	0.012	0.040
73/12/18	14 00		0.068	0.100	0.030	0.015	0.025
74/01/19	09 05		0.124	1.000	0.065	0.015	0.050
74/02/19	13 30		0.088	1.000	0.080	0.025	0.260
74/03/18	15 00		0.048	0.300	0.025	0.010	0.040
74/04/21	08 10		0.064	2.300	0.115	0.010	0.030
74/05/18	09 15		0.128	0.500	0.045	0.017	0.135
74/06/20	08 50		0.084	1.100	0.035	0.020	0.150
74/07/22	14 30		0.116	0.600	0.040	0.010	0.065

STORET RETRIEVAL DATE 76/02/23

2806E1
33 58 25.0 089 40 15.0 4
DURDEN CREEK
28 15 COFFEEVILLE
T/GRENADA LAKE
ST HWY 330 BRDG S EDGE OF COFFEEVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	13 50		0.046	0.110	0.013	0.019	0.072
73/09/19	14 30		0.093	0.350	0.039	0.020	0.125
73/10/24	09 10		0.068	0.250	0.062	0.006	0.170
73/11/19	14 20		0.100	0.700	0.038	0.032	0.070
73/12/18	13 30		0.184	0.500	0.030	0.025	0.055
74/01/19	09 40		0.270	1.600	0.430	0.030	0.065
74/02/19	13 10		0.168	0.600	0.050	0.030	0.130
74/03/18	14 45		0.132	0.800	0.040	0.010	0.040
74/04/21	09 45		0.072	0.300	0.020	0.010	0.040
74/05/18	09 05		0.108	0.800	0.050	0.030	0.200
74/06/20	08 05		0.100	0.700	0.025	0.020	0.095
74/07/22	14 20		0.032	0.400	0.020	0.010	0.050

STORET RETRIEVAL DATE 76/02/23

2806F1
33 57 20.0 089 41 33.0 4
CYPRESS CREEK
28 15 COFFEEVILLE
T/GRENADA LAKE
RD BRDG 1.5 MI SW OF COFFEEVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	12	25	0.028	1.980	0.058	0.015	0.045
73/09/19	14	00	0.036	1.000	0.260	0.013	0.200
73/10/24	09	00	0.034	0.450	0.096	0.011	0.190
73/11/19	14	15	0.032	0.600	0.048	0.008	0.020
73/12/18	13	20	0.052	0.600	0.130	0.010	0.025
74/01/19	09	20	0.240	0.700	0.060	0.020	0.055
74/02/19	13	00	0.144	0.900	0.070	0.040	0.180
74/03/18	14	25	0.020	0.300	0.015	0.010	0.040
74/04/21	08	00	0.004	0.300	0.015	0.005	0.005
74/05/18	08	50	0.224	0.600	0.060	0.025	0.135
74/06/20	08	35	0.020	0.700	0.020	0.020	0.100
74/07/22	14	10	0.044	0.600	0.015	0.010	0.040

STORET RETRIEVAL DATE 76/02/23

2806G1
33 55 55.0 090 43 30.0 4
OKACHICKMA CREEK
28 15 COFFEEVILLE
T/GRENADA LAKE
HWY 7 BRDG 3 MI SW OF COFFEEVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/21	13 00		0.023	0.830	0.035	0.012	0.075
73/09/19	13 50		0.010K	0.500	0.115	0.005K	0.120
73/10/24	08 45		0.015	0.600	0.126	0.005K	
73/11/19	14 05		0.010K	0.350	0.012		0.050
73/12/18	13 15		0.020	0.100	0.025	0.010	0.025
74/01/19	09 30		0.088	0.200	0.035	0.015	0.025
74/02/19	09 30		0.036	0.300	0.020	0.015	0.055
74/03/18	14 15		0.008	0.400	0.015	0.005	0.015
74/04/21	07 55		0.004	0.200	0.010	0.005K	0.030
74/05/18	08 45		0.184	0.300	0.025	0.014	0.045
74/06/20	08 30		0.052	0.700	0.015	0.010	0.060
74/07/22	14 15		0.012	1.800	0.025	0.015	0.170

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/18

2806EA PD2806EA P000100
33 59 00.0 089 40 00.0 4
COFFEEVILLE
28071 TALOBUSHA CO MAP
T/GRENADA LAKE
DURDEN CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/02	09 00		0.040	6.800	0.125	2.300	2.950		
73/06/06	09 00		0.015	5.000	0.097	2.900	3.700		
73/07/05	09 00		0.080	7.800	0.090	4.790	5.300		
74/01/10	22 00		0.840	6.100	0.040	4.050	5.000		
74/01/29	10 00		0.680	5.600	0.040K	2.520	5.250		
74/02/19	10 00		0.520	5.700	0.220	0.820	2.400		
74/03/19	09 00		0.280	5.900	0.170	0.835	2.825		
74/04/18	09 00		0.280	4.700	0.730	2.800	3.700		
74/05/24	14 00		0.240	8.700	0.050K	3.100	4.500		
74/06/19	10 00		0.080	9.900	0.280	2.300	3.800		
74/07/24	09 00		0.120	16.000	0.860	4.850	6.650		

K VALUE KNOWN TO BE
LESS THAN INDICATED